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## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<b>(51) International Patent Classification <sup>6</sup> :</b> <b>B68G 1/00, A47G 9/00, D01F 2/02,</b> <b>D04H 1/00, 1/42, 1/02</b>	<b>A1</b>	<b>(11) International Publication Number:</b> <b>WO 99/16705</b> <b>(43) International Publication Date:</b> 8 April 1999 (08.04.99)
<b>(21) International Application Number:</b> PCT/GB98/02619 <b>(22) International Filing Date:</b> 1 September 1998 (01.09.98)  <b>(30) Priority Data:</b> 9720436.6 26 September 1997 (26.09.97) GB  <b>(71) Applicant (for all designated States except US):</b> FIBRETECH LIMITED [GB/GB]; Brook Mill, Hollins Road, Oldham OL8 4JY (GB).  <b>(72) Inventor; and</b> <b>(75) Inventor/Applicant (for US only):</b> BLACK, Robert, Paul [GB/GB]; New Pale Lodge, Manley, Cheshire WA6 9EZ (GB).  <b>(74) Agent:</b> W.P. THOMPSON & CO.; Coopers Building, Church Street, Liverpool L1 3AB (GB).		<b>(81) Designated States:</b> AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, HR, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).  <b>Published</b> <i>With international search report.</i>
<b>(54) Title:</b> FILLING COMPRISING A POLYESTER FIBRE  <b>(57) Abstract</b>  The present invention relates to a filling comprising a polyester fibre. More particularly it relates to an improved polyester fibre containing filling for use where thermal properties and/or breathability are important, such as in the soft furnishings industry, where it may be used as a filling for bedding, for example duvets, pillows, mattress protectors and sleeping bags or in the clothing industry where it may be used as a filling for coats, anoraks, and the like, particularly ski and winter wear. Polyester fibre, usually polyethyleneterephthalate, is an inexpensive alternative to down or feathers. However it lacks breathability. In an attempt to improve the characteristics of a filling comprising polyester fibre, the polyester fibre has been blended with natural materials such as, for example, cotton, silk, down and feathers. The improvement comprises mixing the polyester with a cellulosic fibre obtained by an organic solvent spinning process to produce a non-woven blend with improved thermal and/or breathability properties. The non-woven may be in the form of fibreballs, a wadding, a padding, a stuffing or a filling material.		

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DESCRIPTIONFILLING COMPRISING A POLYESTER FIBRE

The present invention relates to a filling comprising a polyester fibre. More particularly it relates to an improved polyester fibre containing filling for use where thermal properties and/or breathability are important, such as in the soft furnishings industry, where it may be used as a filling for bedding, for example duvets, pillows, mattress protectors and sleeping bags or in the clothing industry where it may be used as a filling for coats, anoraks, and the like, particularly ski and winter wear.

Polyester fibre, usually polyethyleneterephthalate, is an inexpensive alternative to down or feathers. However it lacks breathability. In an attempt to improve the characteristics of a filling comprising polyester fibre, the polyester fibre has been blended with natural materials such as, for example, cotton, silk, down and feather.

Considerable effort has been made in the industry to provide an improved synthetic filling and in particular one with improved breathability.

It is an aim of the present invention to provide a synthetic fibrefill with improved breathability but which retains at least some of the desirable properties of polyester fibrefill.

It has unexpectedly been found that cellulosic fibres obtained by an organic solvent spinning process, and in particular one in which the organic solvent is N-methyl morpholine oxide (NMMO) e.g. lyocell, when blended (in

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contrast to woven) with a polyester filling fibre such as, for example, polyethyleneterephthalate gives rise to a product with improved characteristics including improved breathability compared to a polyester filling fibre alone. The finding was unexpected given that lyocell fibres are traditionally flat and would not have been expected to be a good filling fibre. Lyocell is a cellulosic fibre made by direct dissolution of wood pulp in an organic solvent and has to date been used primarily in the development of technical textiles, namely woven fabrics comprising interlaced warp and weft threads.

It is another aim of the present invention to provide a synthetic fibrefill with improved thermal performance.

It has unexpectedly been found that cellulosic fibre e.g. lyocell, when blended with a polyester filling fibre, such as, for example, polyethyleneterephthalate gives rise to a product with improved thermal characteristic compared to the component fibres alone.

According to the present invention there is provided a non-woven blend comprising or consisting of a polyester filling fibre and a cellulosic fibre obtained by an organic spinning process.

Preferably the cellulosic fibre is lyocell.

Preferably the polyester filling fibre is polyethyleneterephthalate fibre.

Preferably the blend comprises, by weight, no more than 80%, more preferably still 60%, of the cellulosic fibre, for example, lyocell.

More preferably the cellulosic fibre, for example, lyocell is present in an amount of from 10 - 60% by weight and ranges therebetween, more

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preferably still 20- 60% and more preferably still from 25- 60% of the blend.

Preferably the polyester filling fibre comprises mono fibres which are crimped or conjugate fibres. By conjugate fibres is meant fibres comprising two different fibre-forming polymeric units arranged side by side so that on heat treatment the fibre becomes spirally crimped.

Preferably the cellulosic or lyocell fibre is a saw-toothed crimp fibre.

More preferably the cellulosic or lyocell fibres and polyester filling fibres are formed into a fibre ball. To form a fibre ball it is preferred to use a lyocell cellulosic fibre blended with a conjugate polyester preferably of polyethyleneterephthalate.

Alternatively a lyocell cellulosic fibre and either a conjugate polyester or a regular saw tooth crimp polyester fibre are blended, carded and layered into a wadding. For the avoidance of doubt a wadding is neither a woven product nor a fabric.

Preferably the wadding is more than 3 mm thick and more preferably more than 5 mm thick. It is a loose open material in contrast to compressed materials such as for example felts.

According to a further aspect of the present invention there is provided a bedding article comprising as a filling a non-woven blend of the invention.

According to a further aspect of the present invention there is provided an article of clothing comprising as a filling a non-woven blend of the invention.

The bedding article may be, for example, a duvet, pillow, quilt,

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sleeping bag, cushion or other similar article.

The clothing article may be, for example, a jacket, coat, or anorak.

The non-woven blend has characteristics which make it more desirable than a polyester filling, for example, polyethyleneterephthalate alone:

- 1) it has a more down like feel;
- 2) weight for weight it is warmer than polyethyleneterephthalate; and
- 3) It is breathable, i.e. moisture absorbent;

Fibreballs of the non-woven blend also show improved breathability and thermal properties.

The blending of fibres, and the production of fibre balls are well known processes to the man skilled in the art and are not therefore described herein.

The invention will be further described, by way of example only, with reference to the tabulated test data shown in tables 1 and 2 below:

Table 1 shows the products under test; and

Tables 2 and 3 show the properties of the products under test.

It should be noted with reference to table 1 that pure lyocell has a fill weight of 49.3 gm/m<sup>2</sup>/tog, which is similar to the figure of 49 gm/m<sup>2</sup>/tog for pure polyester. The blend however gives a figure of 39 gm/m<sup>2</sup>/tog ie a synergistic and non obvious effect is achieved with a mixture.

TABLE 1

	Duvet Weight	U.K. Tog Test	Fill wgt gm/m <sup>2</sup> /tog
Cellulosic/ Polyester Carded Blend	2060g	13.5	37
Goose down	1790g	13.5	18
Hollow Polyester fibre Carded	2488g	13.5	49

TABLE 2

	THERMOREGULATORY MODEL OF MAN (MANNIKIN) EFFECTIVE IN USE DATE	Thermal % Difference Insulation From (High best) Cellulosic	Effective % Difference Water Vapour From Resistance Cellulosic (low best)	Water % Difference Vapour From permeability Cellulosic (high best)	Ratio of Thermal % Difference Insulation From to weight Cellulosic (high best)	Thermal Physiological % Difference Comfort (temp. °C) (low best)
Cellulosic/Polyester Carled Blend		7.8	841	0.56	379	5.5°C
Goose down		7.3	845	0.52	490	7.1°C
Hollow polyester fibre		7.21	840	0.51	290	7.40°C
		THIS IS WARMTH RATING	THIS IS THE RESISTANCE TO WATER VAPOUR INVASION	THIS IS THE BREATHABILITY MOISTURE TRANSPORT PROPERTIES	WARMTH TO WEIGHT RATIO	MINIMUM TEMPERATURE BEFORE DISTURBED SLEEP

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TABLE 3

	THERMOREGULATORY MODEL OF SKIN			Buffering Capacity Moisture Transport & Take-up properties	% Difference from Cellulosic
	Water Vapour Take-up (gm/m <sup>2</sup> ) (high best)	% Difference From Cellulosic			
Cellulosic/Polyester Carded Blend	42.0			5.0	
Goose down	42.8	+ 1.9%		4.1	- 18%
Hollow polyester fibre	26.5	-36.9%		4.1	- 18%
	ABILITY TO REMOVE WATER VAPOUR QTY			ABILITY TO TRANSPORT MOISTURE AWAY FROM BODY FROM SWEAT PULSE	
	RATE OF MOISTURE ABSORBANCE				



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It will be noted from test results shown in tables 2 and 3 that the non-woven blend of the invention is significantly better than pure polyester (the current synthetic filling of choice) when it comes to its thermal insulation properties, its water vapour permeability index, its ratio of thermal insulation to weight, its thermal physiological comfort, its water vapour take up and its buffering capacity moisture transport and uptake properties and only insignificantly worse in its effective water vapour resistance. In other words, the non-woven blend confers a higher degree of thermal insulation and possesses better moisture transport properties under stationary conditions combined with better moisture absorption than a pure polyester material.

### CLAIMS

1. A non-woven blend comprising or consisting of a polyester filling fibre and a cellulosic fibre obtained by an organic spinning process.
2. A non-woven blend as claimed in claim 1 wherein the cellulosic fibre is lyocell.
3. A non-woven blend as claimed in claim 1 or 2 wherein the polyester filling fibre is polyethyleneterephthalate fibre.
4. A non-woven blend as claimed in any of the preceding claims comprising, by weight, no more than 80% of the cellulosic fibre.
5. A non-woven blend as claimed in any of the preceding claims wherein the cellulosic fibre is present in an amount, by weight, of from 10-60% of the blend.
6. A non-woven blend as claimed in any of the preceding claims wherein the cellulosic fibre is present in an amount, by weight, of from 20-60% of the blend.
7. A non-woven blend as claimed in any of the preceding claims wherein the cellulosic fibre is present in an amount, by weight, of from 25-60% of the blend.
8. A non-woven blend as claimed in any of the preceding claims wherein the polyester filling fibre comprises monofibres which are crimped or conjugate fibres.
9. A non-woven blend as claimed in any of the preceding claims

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wherein the polyester filling fibre comprises conjugate fibre.

10. A non-woven blend as claimed in any of the preceding claims wherein the cellulosic fibre is a saw-toothed crimp fibre.

11. Fibreballs comprising a non-woven blend as claimed in any of the preceding claims.

12. A wadding comprising a carded and layered non-woven blend as claimed in any of claims 1 to 10.

13. A padding, stuffing or filling material comprising a non-woven blend as claimed in any of claims 1 to 10.

14. A bedding article comprising a non-woven blend as claimed in any of claims 1 to 10, fibreballs as claimed in claim 11, a wadding as claimed in claim 12 or a padding, stuffing or filling material as claimed in claim 13.

15. A bedding article as claimed in claim 14 selected from the group consisting of a duvet, a pillow, a mattress, a mattress protector, a sleeping bag, a topper, a quilt, an enhancer, a comforter and a bed.

16. An article of clothing comprising a non-woven blend as claimed in any of claims 1 to 10, fibreballs as claimed in claim 11, a wadding as claimed in claim 12 or a padding, stuffing or filling material as claimed in claim 13.

17. An article of clothing as claimed in claim 16 selected from the group consisting of a coat, a jacket, an anorak, and ski or winter wear.

# INTERNATIONAL SEARCH REPORT

International Application No  
PCT/GB 98/02619

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 B68G1/00 A47G9/00 D01F2/02 D04H1/00 D04H1/42  
D04H1/02

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 B68G A47G A47C D01F C08J D04H

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0 474 300 A (HURK R A VAN DEN) 11 March 1992 see the whole document ---	1-17
A	WO 96 09546 A (UNIPATH LTD) 28 March 1996  see example see page 8, line 19 - line 22 ---	1,4-7, 12-17
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☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 93 06806 A (LAKISS SMITH ROSEMARIE) 15 April 1993 see page 3, line 5 - line 6 see page 3, line 24 - line 28 ----	1-17
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Information on patent family members

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